

Math Achievement Rubric for Knollwood Report Card Grade 6

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Performance Indicators	Rubric
Number and Numeration; Understands uses / representations of numbers	<p>3</p> <ul style="list-style-type: none"> • Reads and writes whole numbers and decimals • Identifies places in such numbers and the values of the digits in those places • Uses expanded notation, number-and-word notation, exponential notation, and scientific notation to represent whole numbers and decimals • Solves problems involving percents and discounts and explains strategies used • Identifies the unit whole in situations involving fractions, decimals, and percents • Uses GCFs, LCMs, and divisibility rules to manipulate fractions
	<p>2</p> <ul style="list-style-type: none"> • Reads and writes whole numbers and decimals by counting places or with a template • Identifies places in whole numbers and decimals and the value of the digits in those places by counting places or with a template • Uses different notations to represent numbers • Solves problems involving percents and discounts • Identifies the unit whole in situations involving fractions • Identifies prime and composite numbers • Factors numbers using a factor rainbow • Finds prime factorizations
	<p>1</p> <ul style="list-style-type: none"> • Reads and writes whole numbers up to 1,000,000,000 and decimals through thousandths • Identifies places in such numbers and values of the digits in those places using a template • Reads, writes and models simple fractions • Solves problems involving fractional parts of a region or a collection

	<ul style="list-style-type: none"> • Given a fraction part of a region or a collection, identifies the unit whole • Finds multiples of whole numbers less than 10 • Finds whole-number factors of 2-digit numbers
	<p style="text-align: center;">E</p> <ul style="list-style-type: none"> • Applies fraction, decimal, and percent concepts to solve complex word problems • Finds decimals in between decimals and fractions in between fractions and correctly places them on a number line • Solves problems with negative exponents • Finds patterns with powers of 10 and other bases
<p>Number and Numeration: Understands equivalent names for numbers</p>	<p style="text-align: center;">3</p> <ul style="list-style-type: none"> • Applies the order of operations to numerical expressions to give equivalent names for rational numbers • Finds equivalent fractions and fractions in simplest form by applying multiplication and division rules and concepts from number theory • Translates between different number notations (scientific, expanded, standard, etc.) • Converts between fractions, mixed numbers, decimals, and percents
	<p style="text-align: center;">2</p> <ul style="list-style-type: none"> • Uses numerical expressions involving one or more of the basic four arithmetic operations, grouping symbols, and exponents to give equivalent names for whole numbers • Uses numerical expressions to find and represent equivalent names for fractions, decimals, and percents • Uses and explains multiplication and division rules to find equivalent fractions and fractions in simplest form • Translates between some of the different number notations • Converts between fractions and mixed numbers • Converts fractions with denominators that are factors of 100 to decimals, and percents
	<p style="text-align: center;">1</p>

	<ul style="list-style-type: none"> • Uses numerical expressions involving one or more of the basic four arithmetic operations and grouping symbols to give equivalent names for whole numbers • Translates between some of the different number notations when provided with a template or teacher prompting • Uses and explains a multiplication rule to find equivalent fractions • Renames halves, fourths, fifths tenths, and hundredths as decimals and percents
	<p style="text-align: center;">E</p> <ul style="list-style-type: none"> • Evaluates complex expressions using order of operations • Uses knowledge of fractions, decimals, and percents to convert to degrees • Converts between fractions, decimals, and percents with automaticity
<p>Number and Numeration: Understands common numerical relations</p>	<p style="text-align: center;">3</p> <ul style="list-style-type: none"> • Chooses and applies strategies for comparing and ordering rational numbers • Explains or demonstrates strategies used for comparing rational numbers • Understands all relation symbols • Solves proportions for rate and ratio problems • Understands alternate symbols to display rates and ratios
	<p style="text-align: center;">2</p> <ul style="list-style-type: none"> • Compares and orders rational numbers • Uses area models, benchmark fractions and analyses of numerators and denominators to compare and order fractions and mixed numbers • Describes strategies used to compare fractions and mixed numbers • Given the units, solves proportions for rate and ratio problems • Uses cross multiplication to solve an open proportion
	<p style="text-align: center;">1</p> <ul style="list-style-type: none"> • Compares and orders whole numbers up to 1,000,000,000 and decimals through thousandths • Compares and orders integers between -100 and 0 • Uses area models, benchmark fractions and analyses of numerators and denominators to compare and order fractions

Operations and Computation: Computes accurately	<ul style="list-style-type: none"> • Solves rate problems based on a "per-unit" rate • Uses cross products to determine equivalent fractions
	<p style="text-align: center;">E</p> <ul style="list-style-type: none"> • Compares negative fractions and decimals and places them on a number line • Places a relation symbol between complex expression including fractions, decimals, percents, and negatives • Sets up proportions uses them to solve difficult ratio and rate word problems • Writes algebraic equations to describe a proportion or a rate table
	<p style="text-align: center;">3</p> <ul style="list-style-type: none"> • Uses mental arithmetic, paper-and-pencil algorithms, and calculators to accurately operate on whole numbers, decimals, signed numbers, fractions, and mixed numbers • Expresses remainders as fractions or decimals • Uses order of operations correctly and appropriately to evaluate an expression • Begins multi-digit computation with automaticity
	<p style="text-align: center;">2</p> <ul style="list-style-type: none"> • Uses mental arithmetic, paper-and-pencil algorithms, diagrams, area models, and calculators to operate on whole numbers, decimals, signed numbers, fractions, and mixed numbers • Expresses remainders with an R # • Understands that there is an order of operations • Fact knowledge may impede speed and accuracy
	<p style="text-align: center;">1</p> <ul style="list-style-type: none"> • Attempts to use strategies to operate on whole number, decimals, signed numbers, fractions, and mixed numbers • Benefits from the use of manipulatives to calculate answers • Operates from left to right • Fact knowledge often impedes speed and accuracy
	<p style="text-align: center;">E</p> <ul style="list-style-type: none"> • Performs calculations on all rational numbers and can explain the underlying principles

	<ul style="list-style-type: none"> • Can identify and operate on irrational numbers • Chooses the appropriate way to express a remainder • Computes with a strong intuitive number sense
Operations and Computations: Makes reasonable estimates	<p>3</p> <ul style="list-style-type: none"> • Makes reasonable estimates for whole number, decimal, fraction, and mixed number addition, subtraction, multiplication, and division problems • Explain how the estimates were obtained • Uses estimation to check answers
	<p>2</p> <ul style="list-style-type: none"> • Makes reasonable estimates for whole number and decimal problems • Makes reasonable estimates for fractions with assistance
	<p>1</p> <ul style="list-style-type: none"> • Makes estimates for whole number and decimal problems using calculations that are sometimes inaccurate • Makes more appropriate estimates with assistance
	<p>E</p> <ul style="list-style-type: none"> • Estimates are calculated with precision • Able to make real world estimates and use appropriate units to measure quantities • Regularly estimates in order to evaluate and/or check if an answer is reasonable
Geometry and Measurement: Investigates 2- and 3- dimensional shapes	<p>3</p> <ul style="list-style-type: none"> • Chooses and uses appropriate formulas to calculate the circumference of circles and to solve area, perimeter, and volume problems • Identifies and describes similar and congruent figures and describes their properties • Constructs a figure that is congruent to another figure using compass and straightedge • Calculates missing sides on similar figures and determines the size-change factor
	<p>2</p> <ul style="list-style-type: none"> • Describes and uses strategies to find the perimeter of polygons • Chooses and uses appropriate formulas to calculate the areas of rectangles,

	<p>parallelograms, and triangles, and the volume of a rectangular prism</p> <ul style="list-style-type: none"> • Differentiates between similar and congruent figures • Calculates missing sides on similar figures when given a size-change factor
	<p>1</p> <ul style="list-style-type: none"> • Describes strategies used to find area and perimeter when given a model • Using a given formula, calculates perimeter, area, and volume of a rectangular prism • Understands the definition of congruence • Enlarges a polygon given a whole number size-change factor
	<p>E</p> <ul style="list-style-type: none"> • Works backwards to find a dimension of a shape given area or volume • Solves for variable dimensions in perimeter, area, or volume problems (ex: the sides of a triangle are $x+1$, $2x-3$, and x. if the perimeter is 20 units, how long is each side?) • Calculates the area of an irregular figure by breaking it up into parts • Uses the Pythagorean Theorem to solve for missing sides of a right triangle
<p>Geometry and Measurement: Applies transformations and symmetry</p>	<p>3</p> <ul style="list-style-type: none"> • Identifies, describes, and sketches (including plotting on the coordinate plane) instances of reflections, translations, and rotations • Consistently uses ordered pairs of numbers to name, locate, and plot points in all four quadrants of a coordinate grid • Able to identify the x and y axes
	<p>2</p> <ul style="list-style-type: none"> • Identifies, describes, and sketches examples of translations • Identifies, describes, and sketches examples of rotations and reflections using tracing paper • Uses ordered pairs of numbers to name, locate, and plot points in all four quadrants of a coordinate grid with prompting

	<p>1</p> <ul style="list-style-type: none"> • Identifies, describes, and sketches examples of translations using tracing paper • Uses ordered pairs of numbers to name, locate, and plot points in the first quadrant
	<p>E</p> <ul style="list-style-type: none"> • Sketches complex isometric transformations on a coordinate plane • Able to graph a line and determine the slope and y-intercept
<p>Geometry and Measurement: Uses appropriate strategies to measure angles</p>	<p>3</p> <ul style="list-style-type: none"> • Estimates the measure of angles (including reflex) with and without tools • Uses tools to precisely draw angles (+ or – 2 degrees) with given measures • Applies definitions & properties of supplementary, complementary, vertical, alternate interior, and corresponding angles to find missing angle measures • Applies properties of sums of angle measures in triangles and quadrangles to find missing angle measures
	<p>2</p> <ul style="list-style-type: none"> • Estimates the measure of angles with and without tools • Uses tools to draw angle with given measures • Identifies, describes, compares, names, and draws right, acute, obtuse, straight, and reflex angles • Determines angle measures in vertical and supplementary angles and by applying properties of sums of angle measures in triangles and quadrangles
	<p>1</p> <ul style="list-style-type: none"> • Identifies and describes right, acute, straight, and obtuse angles • Given the properties of sums of angle measures in triangles and quadrangles, can determine angle measures • Calculates the measure of a missing vertical angle • Calculates the measure of a missing angle that is supplementary to one other angle
	<p>E</p> <ul style="list-style-type: none"> • Completes complicated angle puzzles that incorporate all of the different angle

	properties and can explain how and why measurements were determined
Data and Chance: Selects / creates graphs of data	<p>3</p> <ul style="list-style-type: none"> Collects and organizes data or uses given data to create bar, line, circle, and stem-and-leaf graphs with reasonable titles, labels, keys, and intervals Chooses the appropriate graph to represent a situation
	<p>2</p> <ul style="list-style-type: none"> Collects and organizes data or uses given data to create bar, line, and circle graphs with reasonable titles, labels, keys, and intervals
	<p>1</p> <ul style="list-style-type: none"> Uses given data to create charts, tables, bar graphs, line plots, and line graphs Collects data but the visual representation may not give us a clear picture of it
	<p>E</p> <ul style="list-style-type: none"> Applies collection and graphing of data to real world situations Analyzes and interprets persuasive data and graphs Makes inferences and formulates arguments based on displays and analysis of data Interprets and constructs step graphs Uses graphs to compare data
Data and Chance: Analyzes and interprets data	<p>3</p> <ul style="list-style-type: none"> Uses the maximum, minimum, range, median, mode, and mean and graphs to ask and answer questions, draw conclusions, and make predictions Compares and contrasts the median and mean of a data set
	<p>2</p> <ul style="list-style-type: none"> Uses the maximum, minimum, range, median, mode, and mean and graphs to ask and answer questions
	<p>1</p> <ul style="list-style-type: none"> Attempts to find the maximum, minimum, range, median, mode, and mean
	<p>E</p> <ul style="list-style-type: none"> Recognizes and can explain how outliers will affect a data set Reads and interprets back to back stem-and-leaf plots

	<ul style="list-style-type: none"> • Compares data sets and analyzes the meaning of landmarks to make inferences • Selects the most appropriate measure of central tendency for a data set
Data and Chance: Understands / applies concepts of probability	<p style="text-align: center;">3</p> <ul style="list-style-type: none"> • Uses the Multiplication Counting Principle, tree diagrams, and other counting strategies to identify all possible outcomes for a situation • Predicts results of experiments, tests the predictions using manipulatives, and summarizes the findings • Compares predictions based on theoretical probability with experimental results and explains how sample size affects results • Calculates probabilities and expresses them as fractions, decimals, and percents • Determines the fairness of a game
	<p style="text-align: center;">2</p> <ul style="list-style-type: none"> • Describes events using certain, very likely, likely, unlikely, very unlikely, impossible and other basic probability terms • Expresses the probability of an event as a fraction, decimal, or percent • Uses more likely, equally likely, same chance, 50-50, less likely, and other basic probability terms to compare events • Understands that in a fair game each player must have a 50-50 chance of winning • Predicts the outcomes of experiments, tests the predictions using manipulatives, and summarizes the results • Compares predictions based on theoretical probability with experimental results
	<p style="text-align: center;">1</p> <ul style="list-style-type: none"> • Describes events using certain, very likely, likely, unlikely, very unlikely, impossible and other basic probability terms • Uses more likely, equally likely, same chance, 50-50, less likely, and other basic probability terms to compare events • Given a tree diagram, can write in expected numbers appropriately • Predicts the outcomes of experiments and tests the predictions using manipulatives • Expresses the probability of an event as a fraction

	<p>E</p> <ul style="list-style-type: none"> • Makes a connection between probability and Pascal's Triangle • Builds tree diagrams based on complicated mazes • Creates a set of rules to make an unfair game fair
<p>Patterns, Functions, and Algebra: Understands patterns and relationships</p>	<p>3</p> <ul style="list-style-type: none"> • Extends, describes, and creates numeric patterns • Describes rules for patterns and uses them to solve problems • Represents patterns and rules using algebraic notation • Represents functions using words, algebraic notation, tables and graphs • Translates from one representation to another and uses representations to solve problems involving functions
	<p>2</p> <ul style="list-style-type: none"> • Extends, describes, and creates numeric patterns • Describes rules for patterns and uses them to solve problems • Writes rules for functions involving the four basic arithmetic operations • Represents simple functions using words, symbols, tables, and graphs and uses those representations to solve problems
	<p>1</p> <ul style="list-style-type: none"> • Extends, describes, and creates numeric patterns involving one operation • Describes rules for patterns and uses them to solve problems • Recognizes vertical patterns in tables • Uses words and symbols to describe and write rules for functions that involve one of the four basic arithmetic operations • Performs operations on inputs to get outputs in a table • Attempts to connect the table to a graph
	<p>E</p> <ul style="list-style-type: none"> • Given a word problem, represents the situation in algebraic notation, creates a table of data and graphs it • Analyzes and interprets patterns and algebraic situations to make predictions and inferences

	<ul style="list-style-type: none"> • Able to work backwards to find inputs given outputs with complicated patterns
<p>Patterns, Functions, and Algebra: Uses algebraic notation to represent and analyze</p>	<p>3</p> <ul style="list-style-type: none"> • Determines whether equalities and inequalities are true or false • Solves open number sentences and equations and explains the solutions • Graphs solution sets to open inequalities • Uses a pan-balance model to solve linear equations in one or two unknowns • Describes and applies the conventional order of operations • Describes and applies the properties of arithmetic and multiplicative and additive inverses • Describes and applies the distributive property and combines like terms • Given the value of a variable, correctly evaluates an expression containing that variable
	<p>2</p> <ul style="list-style-type: none"> • Determines whether number sentences are true or false • Solves one step open number sentences or multi-step given the steps to perform on each side • Uses a letter variable to write an open sentence to model a number story • Uses a pan-balance model to solve linear equations in one unknown • Evaluates numeric expressions using order of operations • Inserts grouping symbols to make number sentences true • Recognizes that multiplication and division “un-do” each other and addition and subtraction “un-do” each other • Applies the Distributive Property of Multiplication over Addition when presented with the factor on the left of the parenthesis • Adds like terms when given variables to the first power
	<p>1</p> <ul style="list-style-type: none"> • Uses conventional notation to write expressions and number sentences using the four basic arithmetic operations • Determines whether number sentences are true or false

	<ul style="list-style-type: none"> • Solves open sentences when given the steps to perform on each side of the equal sign • Evaluates numeric expressions containing grouping symbols using a template • Uses manipulatives to set up a pan-balance model to solve an equation • Recognizes that operations must be performed on both sides of the equals sign to keep the equation "in balance"
<p>Open-Ended Response: Applies skills / concepts to multi-step problems</p>	<p style="text-align: center;">E</p> <ul style="list-style-type: none"> • Solves equations with variable and number terms on both sides of the equal sign • Uses the distributive property and combines like-terms on both sides of the equal sign before attempting to solve for the variable • Uses algebra to represent real world situations and solve problems • Multiplies binomials using a method the FOIL method • Solves a system of equations with two unknowns
	<p style="text-align: center;">3</p> <ul style="list-style-type: none"> • Analyzes problems, identifies components, and then formulates plan for solving • Extends, modifies, or reformulates methods as solution unfolds • Can support numeric solutions with graphical representations • Uses prescribed graphical representations and/or physical objects to solve problems or illustrate solutions • Explains solutions to problems using sentences/paragraphs in speaking or writing • Makes overt connections with graphical or pictorial representations • Uses mathematical terminology appropriate to the situation
	<p style="text-align: center;">2</p> <ul style="list-style-type: none"> • Uses prescribed processes to solve problems • Can use alternate processes to solve problems following demonstration of such • Graphical representations accompany solutions when required • Describes process of solving problems with simple sentences or bulleted phrases • Sketches of physical objects, simple graphic organizers, or graphs to represent the situation sometimes accompany written responses • Mathematical terminology included in the problem can be included in explanation of solution

	<p>1</p> <ul style="list-style-type: none"> • Uses parts of given processes to begin to solve problems • Graphical representations serve as add-on to solutions • Names parts of the solution • Tells about problem using some mathematical terms given in the problem • Sketches or graphs are sometimes presented with the solution but are not always clearly linked
	<p>E</p> <ul style="list-style-type: none"> • Designs methods of solving problems based on analysis and application of given theories and knowledge in new situations • Provides counter examples in order to prove solutions • Chooses to use graphical representations and/or physical objects in unorthodox ways to solve problems or illustrate solutions • Convinces others that solutions to problems are plausible and supports his/her thinking by using sentences/paragraphs in speaking or writing and makes clear and overt connections with graphical or pictorial representations • Communications always contain appropriate and sophisticated mathematical language and notations